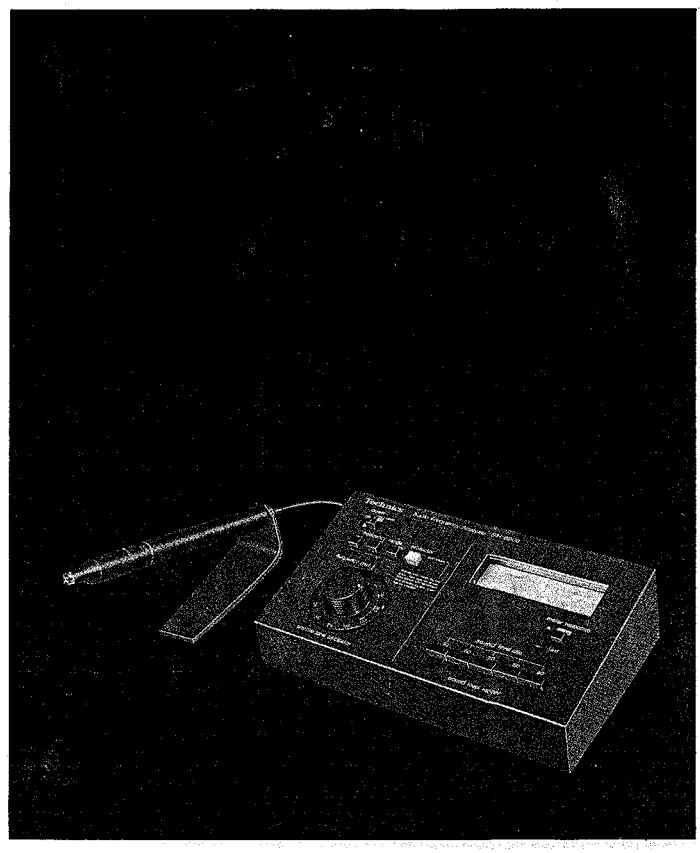
Technics

Audio Frequency Analyzer

SH-8000

OPERATING INSTRUCTIONS



Before operating this unit, please read these instructions completely.

ENGLISH

Dear Stereo Fan

We want to thank you for selecting this product and to welcome you to the growing family of satisfied Technics product owners around the world.
We feel certain you will get maximum enjoyment from this new addition to your home.
Please read these operating instructions carefully, and be sure to keep them handy for convenient reference.

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MAINTENANCE OF EXTERNAL SURFACES

To clean, use a soft dry cloth.
If the surfaces are extremely dirty, use a soft cloth, dipped into a soap and water solution or a weak detergent solution.
Wring the cloth well before wiping the unit.
Wipe once again with a soft dry cloth.
Never use alcohol, paint thinner, benzine, nor a chemically treated cloth to clean this unit.
Such chemicals may damage the finish of your unit.

TECHNICAL SPECIFICATIONS

Overall frequency response

Frequency response: 20 Hz~20 kHz ±2 dB

Main unit

■ **Oscillation section**

Oscillation signal: Warble tone (modulation frequency: 8 Hz)

Oscillation frequencies:
20, 25, 31.5, 40, 50, 63, 80, 100, 125, 160, 200, 250, 315, 400, 500, 630, 800, 1k, 1.25k, 1.6k, 2k, 2.5k, 3.15k, 4k, 5k, 6.3k, 8k, 10k, 12.5k, 16k, 20k (Hz)
(Measurement points: 31)

Frequency precision: ±6% or less

Rated output/output impedance: 70 mV/1 kΩ

■ **Meter section**

Sound-pressure measurement range:
35 dB~105 dB SPL (0 dB = 2×10^{-4} μbar)
(50~90 dB: 10 dB steps, switchable in 5 ranges)

Meter response time:

FAST:	**(attack time)**	350 msec.
	(recovery time)	400 msec.
SLOW:	**(attack time)**	550 msec.
	(recovery time)	2 sec.

■ **General**

Power source: DC 9V (National 006P (6F22) or equivalent)

Battery life: 10 hours (continuous operation, using National "006P" battery)

Dimensions (W×H×D): 215 × 62 × 122 mm (8-15/32" × 2-7/16" × 4-13/16")

Weight: 1.0 kg (2.2 lb.)

Microphone

Type: Back-electret-condenser type

Directional characteristic: Non-directional

Sensitivity (front): −72 dBV/μbar (1 kHz)

Frequency response: 20 Hz~20 kHz

Maximum input sound pressure: 110 dB SPL ($0\ dB = 2\times10^{-4}$ μbar)

Output impedance: 600Ω unbalanced

Power source: DC 1.5V (National SUM-3 (AA size) or equivalent)

Battery life: 1500 hours (continuous operation, using National "SUM-3" battery)

Cord length: 4 m (13 ft.)

FOR SAFE USE OF THIS UNIT

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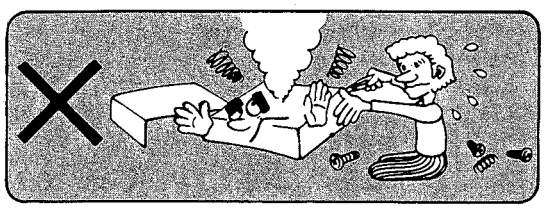
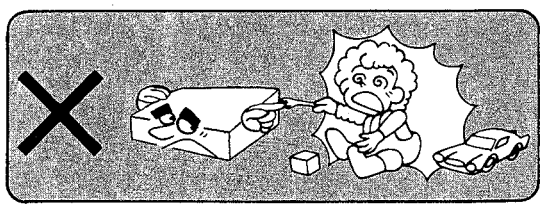
■ Never attempt to repair or reconstruct this unit

A serious electric shock might occur if this unit is repaired, disassembled or reconstructed by unauthorized persons, or if the internal parts are accidently touched.



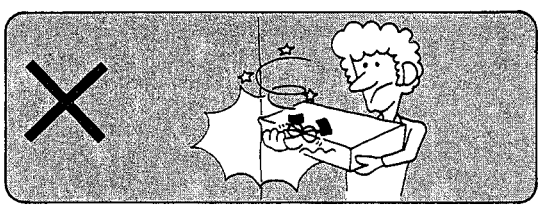
■ For families with children

Never permit children to put anything, especially metal, inside this unit. A serious electric shock or malfunction could occur if articles such as coins, needles, screwdrivers, etc. are inserted through the ventilation holes, etc. of this unit.



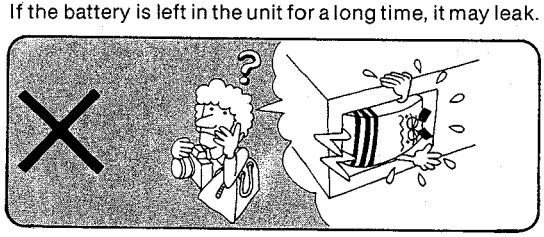
■ Do not drop this unit or subject it to any other strong impact.

To do so will damage internal components and cause a malfunction.



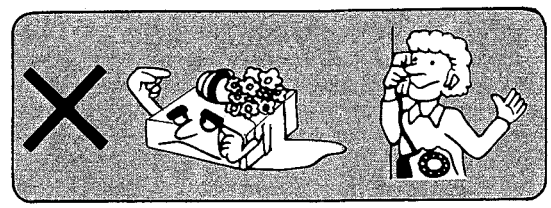
■ Be sure to remove the battery if the unit is not to be used for a long time.

If the battery is left in the unit for a long time, it may leak.



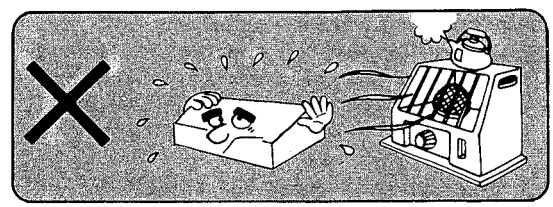
■ If water is spilled on the unit

Be extremely careful if water is spilled on the unit, because a fire or serious electric shock might occur. Immediately disconnect the power cord plug, and consult with your dealer.



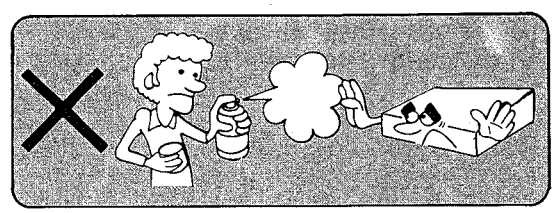
■ Keep the unit away from stoves, etc.

Heat can damage the external surfaces as well as internal circuits and components.



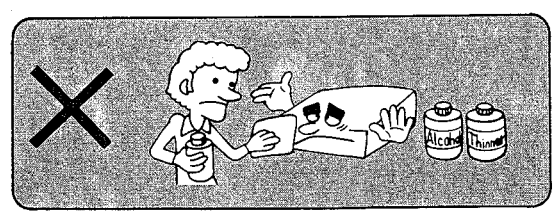
■ Avoid spray-type insecticides

Insecticides might cause cracks or "cloudiness" in the cabinet and plastic parts of this unit. The gas used in such sprays might, moreover, be ignited suddenly.



■ Never use alcohol or paint thinner

These and similar chemicals should never be used, because they may damage the finish.



■ If trouble occurs

If the unit ceases to function during use, contact your dealer or an Authorized Service Center.

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FEATURES

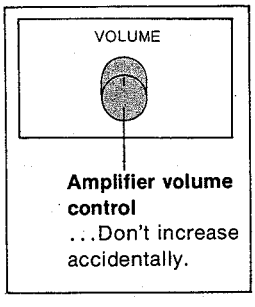
- The SH-8000 Audio Frequency Analyzer is designed to measure the overall frequency response (also known as the sound-field frequency response) of the entire audio system, including the listening room itself.
- In order for you to be able to obtain the maximum performance capability from your audio system, some very important factors are a room which possesses excellent transmission characteristics and the correct location of each component within the room. These transmission characteristics are extremely complex because of the following factors which affect the "performance" of the listening room:
  ① The increase in the low-frequency range caused by reflections from the floor and walls, and the disorderly frequency response caused by the standing wave.
  ② The insufficiency in the high-frequency range resulting from the absorption of treble sounds by various objects and materials in the room.
  ③ The instability of localization, caused by differences between left and right transmission characteristics, plus the effects resulting from the addition of reverberation characteristics and vibration resonance.
- Until now, for lack of a method for correct measurement of these characteristics, the audio enthusiast has tried to improve (compensate) the situation by using blocks under the speaker systems, heavy curtains at windows, carpeting on the floor, etc., in order to suppress the increase in the low-frequency range and the reflections and absorptions found in the room, but has had to rely upon his/her own hearing when trying these various countermeasures.
- Because the Audio Frequency Analyzer can be used to make correct measurements at any frequency within the range of 20 Hz to 20 kHz, and thereby discover useful information concerning the overall frequency response of the entire audio system, including the listening room itself, it then becomes possible, by using a graphic equalizer (sold separately) to compensate and flatten the frequency response.
- However, because we cannot simply say in every instance that a flat frequency response is the most desirable, depending upon the music source, you should make compensations based upon a certain standard and then try to obtain the sound most pleasing to your own ear, and in that way truly obtain the best performance from the audio system.

TO AVOID SPEAKER (TWEETER) DAMAGE

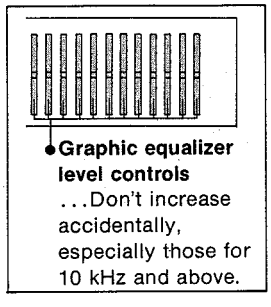
If an excessive input (1 W or more) is continuously applied to the speakers (tweeters) during measurement or compensation operations, the speakers may be damaged. Take care concerning the following points in order to avoid such damage.

① Do not accidentally increase the amplifier volume level or the equalizer level.

Because the human ear cannot easily perceive the measurement frequency (the oscillation signal from this unit) as it approaches the upper limit (20 kHz) of the audible range, one might suppose that no sound is being emitted and then, without thinking, increase the volume level. This can damage the tweeters if the output becomes 1 W or more.

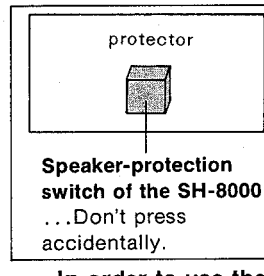


Amplifier volume control
...Don't increase accidentally.



- **Graphic equalizer level controls**
...Don't increase accidentally, especially those for 10 kHz and above.

② Do not accidentally press the speaker-protection switch.



Speaker-protection switch of the SH-8000
...Don't press accidentally.

If it is pressed after the "× 100" frequency-range selector is pressed, and the amplifier volume control is set so that the output is 1 W or higher, the tweeters might be damaged.

In order to use the unit within 1 W . . .

- **When measuring, follow step 9 on page 8.**
- **When making compensation, do not increase the amplifier volume control beyond the position determined in step 11 on page 11.**

In addition, if the listening room is large, do not increase the volume level beyond the level determined in the sections "If distance from speaker systems to listening point exceeds 4 m" on pages 7 and 10.

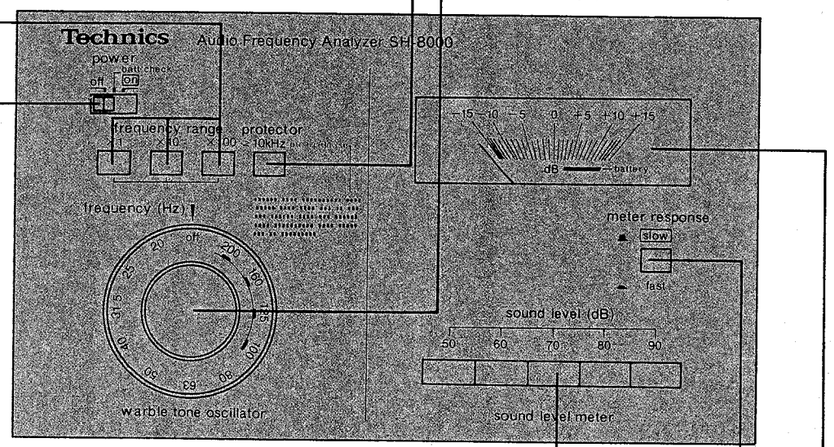
CAUTIONS WHEN USING THE MICROPHONE

The microphone of this unit is especially designed for measurement use.
Never use this microphone for vocal use, because a large popping sound will be emitted when the power switch is switched on and off.

CONTROLS AND THEIR FUNCTIONS

Warble-tone oscillation controls (warble tone oscillator)

- **Power/battery-check switch (power)**
  This switch is used to switch on and off the power of this unit and to check the battery strength. (See page 6 for information concerning checking the battery strength.)
- **Frequency-range selectors (frequency range)**
  These selectors are used to select the frequency range to be measured.
  - × **1:** Press this selector to select the frequency range of 20 Hz to 200 Hz.
  - × **10:** Press this selector to select the frequency range of 200 Hz to 2 kHz.
  - × **100:** Press this selector to select the frequency range of 2 kHz to 20 kHz.
- **Speaker-protection switch (protector (≥10 kHz))**
  This switch is to be used when a frequency of 10 kHz or higher is to be oscillated. While this switch is pressed in, the signal is oscillated, and, when it is not pressed, a low-frequency signal is emitted, regardless of the position to which the frequency selector is set.
  The reason for this is because the human ear cannot easily perceive high-frequency audio signals of 10 kHz and higher, and, if the playback level were to be accidentally increased too much, the excess signal applied to the speakers might damage the tweeters.
- **Frequency selector**
  This selector is used, in combination with the frequency-range selectors, to select the measurement frequency (20 Hz to 20 kHz).



Sound-level meter and controls (sound level meter)

- **Sound-level selectors (sound level (dB))**
  These selectors are used to select the value indicated by the meter.
  - **Meter response-speed selector (meter response)**
    This selector is used to select the indication response speed (time) of the level meter.
    slow (▁▂▁):
    Set to this (unpressed) position to measure the frequency response of the sound field or to measure average sound-pressure levels of music and other signals.
    fast (▁▂▁):
    Set to this (pressed-in) position to measure fast-changing sound-pressure levels of music and other signals.
    - **Level meter**
      This meter displays, with a range of from ±15 dB, the sound level selected by one of the sound-level selectors. This meter also indicates battery strength when the power/battery-check switch is set to the "batt. check" position. (See page 6 for information concerning checking the battery strength.)

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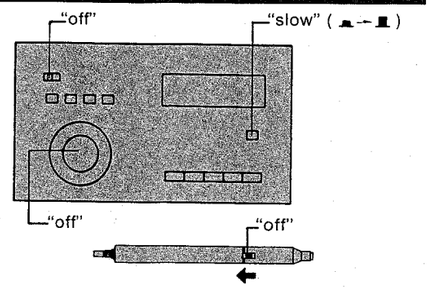
PREPARATIONS BEFORE MEASUREMENT

This unit has been pre-adjusted to operate precisely with the microphone included. If, therefore, it ever becomes necessary to replace the microphone, a re-adjustment is required and the unit should also be included with the microphone when it is submitted for replacement to an authorized service center or Technics dealer.

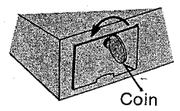
Control settings



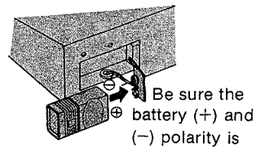
Battery insertion

■ **Main unit battery**
(Battery for main unit: National 006P (6F22) (option) or equivalent)

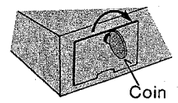
① Remove the screw.



② Connect the battery.



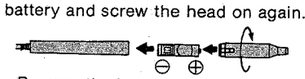
③ Insert the battery, close the cover and tighten the screw.



■ **Microphone battery**
(Battery for microphone: National SUM-3 (AA size) (option) or equivalent)

① Remove the microphone head.

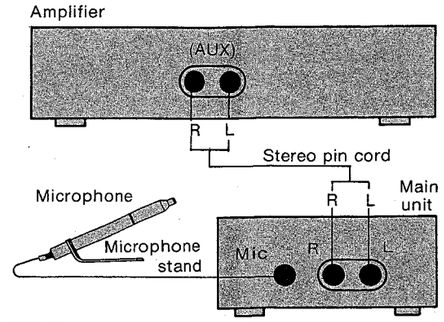
② Insert the battery and screw the head on again.



Be sure the battery (+) and (−) polarity is correct.

Notes about batteries
- If the unit is not to be used for a long time, remove the batteries.
- When the batteries become weak, replace them with new ones.
- Do not attempt to recharge the batteries or take them apart, and do not expose them to high temperatures or short-circuit them.

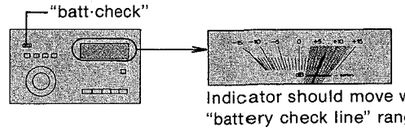
Connection of amplifier and microphone



Checking battery strength

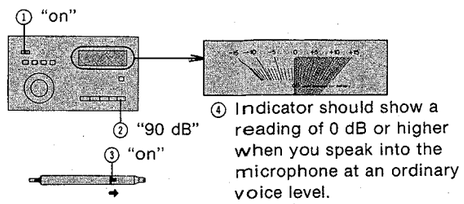
Check as described below. If the battery is weak, replace it with a new one.

■ **Checking the main unit battery**



Indicator should move within "battery check line" range.

■ **Checking the microphone battery**


① "on"
② "90 dB"
③ "on"
④ Indicator should show a reading of 0 dB or higher when you speak into the microphone at an ordinary voice level.

Placement of microphone and main unit

■ **Placement of microphone**
The microphone should always be placed where the music is to be heard (the "listening point"), and at about the same height as the ears.

Note:
If a compensation adjustment or measurement is to be made in a large room or in a room in which there are few reverberations, determine the maximum volume value of the amplifier before placing the microphone in position (in order to avoid damaging the tweeters). (See pages 7 and 10.)

■ **Placement of the main unit**
Be sure to place the main unit in a horizontal position. If it is tilted, the meter indication might vary.

MEASUREMENT OF SOUND-FIELD FREQUENCY RESPONSE

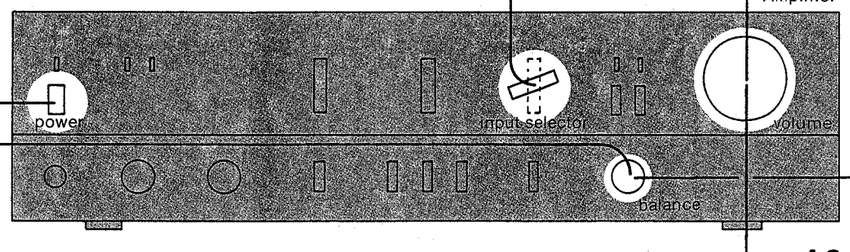
(Be sure the preparations on page 6 have been completed.)

If distance from speaker systems to listening point exceeds 4 m

In order to avoid damge to the tweeters, it is very important to first determine the maximum volume value of the amplifier before making any measurements.

① Place the microphone one meter in front of the speaker system.
② Operate as described in steps 1 to 9.
(Be absolutely sure in step 7 to press the "90 dB" selector.)
③ Return the microphone to the listening point and make the measurement. (Follow steps 7 through 11.)

Caution:
Be absolutely sure not to increase the volume level of the amplifier above the level determined in step ② (the maximum volume value of the amplifier).



1 "0"

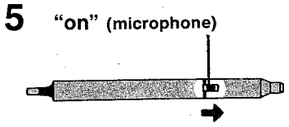
2 "aux"

3 "on"

4 "left"
(Each channel is measured individually.)

11 **Measure the right channel.**
Set to the "right" position and repeat step 10.

5 "on" (microphone)

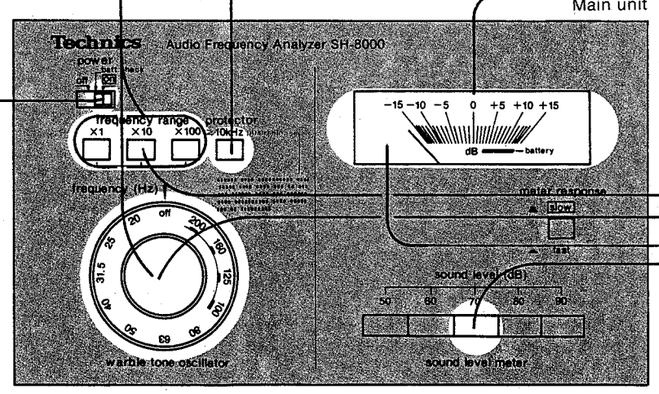


10 Change the frequency settings in order from 20 Hz to 20 kHz, and, after each frequency setting, record the meter reading on the diagram as shown in the example on the page at the right.

- Press "×1" for frequencies between 20 Hz to 200 Hz.
- Press "×10" for frequencies between 200 Hz to 2 kHz.
- Press "×100" for frequencies between 2 kHz to 20 kHz.

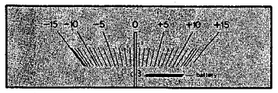
- **Press this button when measuring frequencies of 10 kHz and higher.**
In order to prevent damage to the tweeters of your speaker systems, this unit is designed so that no oscillation is emitted for frequencies of 10 kHz and higher unless this button is pressed. This button must, therefore, be pressed each time when a measurement is made.

Main unit



6 "on"

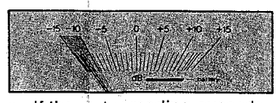
9 **Adjust the volume control of the amplifier so that this meter reads 0 dB.**



Note:
The position to which the volume control is set will subsequently become the reference level, so this setting should not be changed until the measurements are completed.

8 **Set the measurement frequency to 1 kHz.**
- Press the "×10" button.
- Set to 100.

7 **Press the "70 dB" button.**
- Check to be sure that the meter shows a reading of −10 dB or less when no sound is emitted.



- If the meter reading exceeds −10 dB, either reduce the nearby noise or press the "80 dB" button.

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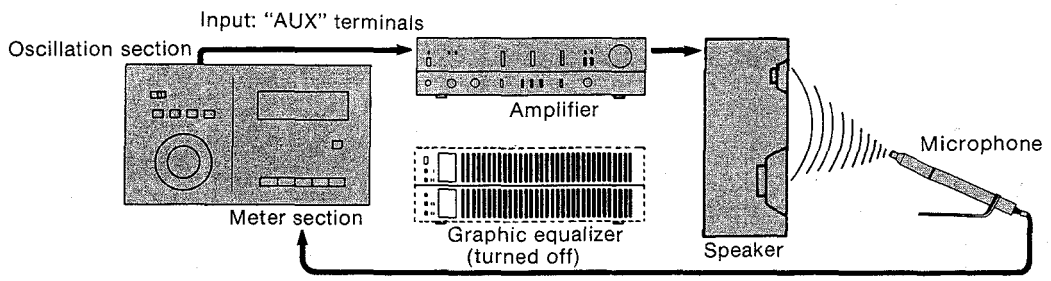
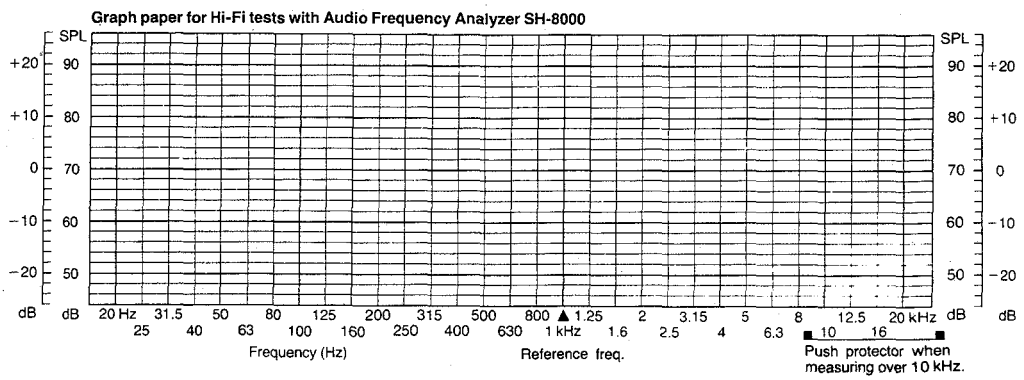
Signal flow



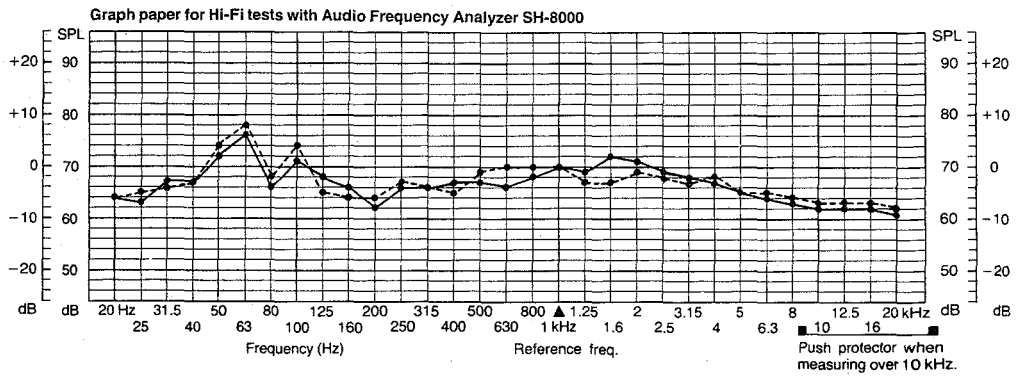
Response graph

Record the measured data in the figure below. (Extra response graphs are also included.)



Measurement example

The figure below shows an example of recorded measurements.
(•- - - -•indicates left channel, •———• indicates right channel.)



Note:
After measurements are completed, be sure to switch off the power of the main unit and of the microphone.

MAKING COMPENSATION ADJUSTMENTS OF SOUND-FIELD FREQUENCY RESPONSE USING A GF

ENGLISH

If distance from speaker systems to listening point exceeds 4 m

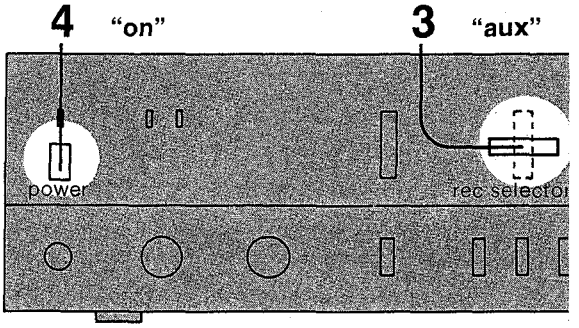
In order to avoid damage to the tweeters, it is very important to first determine, as described below, the maximum volume value of the amplifier before making any compensation adjustments.

① Place the microphone one meter in front of the speaker system.

② Operate as described in steps 1 to 11.
(Be absolutely sure in step 9 to press the "80 dB" selector, and in step 10 to set to the "1 kHz" position.)

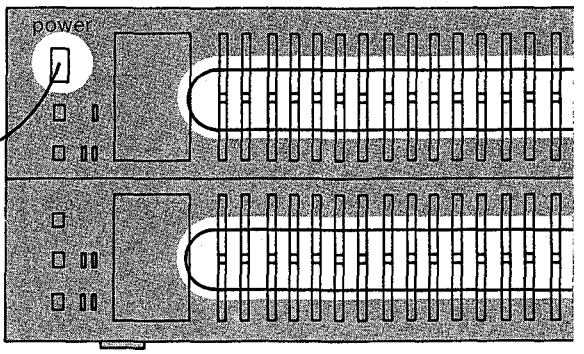
③ Return the microphone to the listening point and make the compensation adjustment. (Follow steps 9 through 15.)

Caution:
Be absolutely sure not to increase the volume level of the amplifier above the level determined in step ② (the maximum volume value of the amplifier).



5 "left"

(Compensation adjustment is made for each channel individually.)

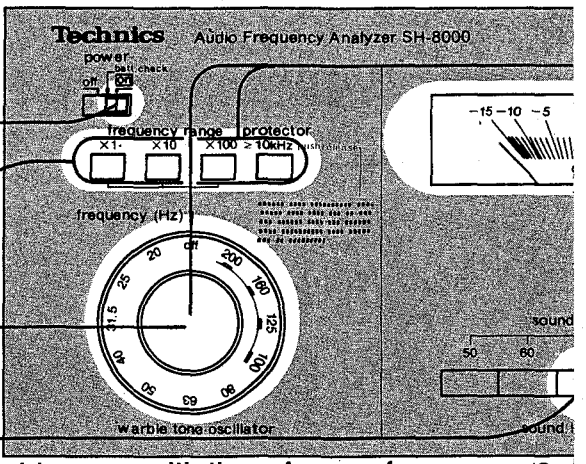


6 "on"

Caution:
Turn the equalizer on, and set all of the frequency adjustment controls to the center position.

7 "on" *(microphone)*

8 "on"



9 "70 dB"

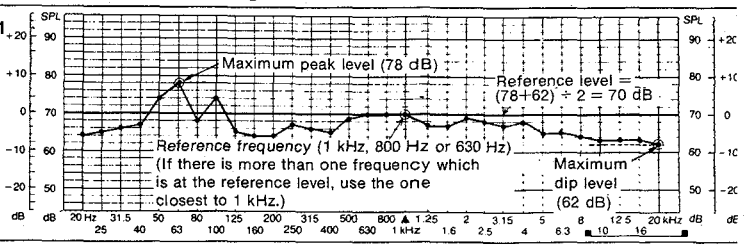
Press "80 dB" when, for step 7 on page 8, "80 dB" is pushed.

10 Set to agree with the reference frequency. (See

Determination of the reference frequency

- Referring to the measured data, find the value of the highest peak and of the lowest dip. The average (add them together and divide by two) sound-pressure level for these two points, becomes the reference level, and the frequency which crosses that point in the graph becomes the reference frequency. In the graph at the right it is 1 kHz.

Example 1

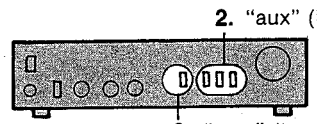

SPL
Maximum peak level (78 dB)
Reference level = (78+62) ÷ 2 = 70 dB
Reference frequency (1 kHz, 800 Hz or 630 Hz)
(If there is more than one frequency which is at the reference level, use the one closest to 1 kHz.)
Maximum dip level (62 dB)
dB
20 Hz 31.5 50 80 125 200 315 500 800 1.25 2 3.15 5 8 12.5 20 kHz
25 40 63 100 160 250 400 630 1 kHz 1.6 2.5 4 6.3 10 16

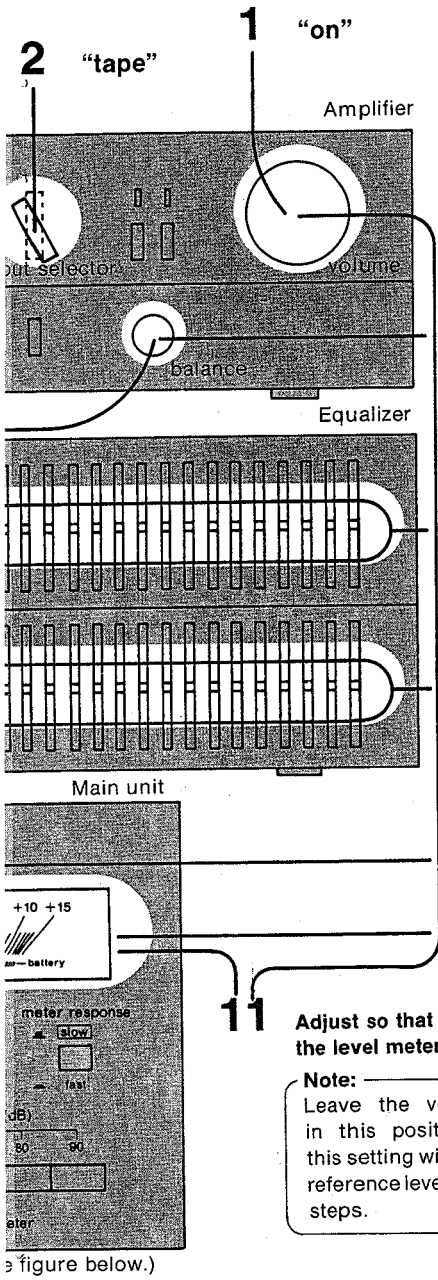
PHIC EQUALIZER

(Be sure that the preparations for measurement on page 6 are completed.)

Connection note:
Be sure to connect the graphic equalizer to the "TAPE" terminals of the amplifier.

If your amplifier has a tape-monitor selector, make the following settings for steps 2 and 3.





15 Compensation adjustment for the right channel
Set to the "right" position and repeat steps 12 to 14.

14 Repeat steps 12 and 13 so that the sound-level meter shows a reading of 0 dB for all frequencies.

13 Move the control element which corresponds to the frequency (set in step 12) up and down to adjust so that the sound-level meter shows a reading of 0 dB.

Note:
If peaks and dips are extremely sharp and deep, it may not be possible to make the compensation adjustment by using only a graphic equalizer.
If so, good results cannot be obtained by using the volume control of the amplifier to "force" the compensation adjustment, because distortion will increase.
Moreover, there is in particular the possibility that the tweeters of the speaker systems will be damaged at high frequencies exceeding 10 kHz.

12 Referring to the measurement data, set to each of the frequencies corresponding to the frequencies where peaks and dips are found in the measurement data.
Begin by first making compensation adjustments for the large peaks and dips, and then make compensation for the other peaks and dips, beginning from the low-frequency ones. (Refer to the examples on pages 12 and 13.)

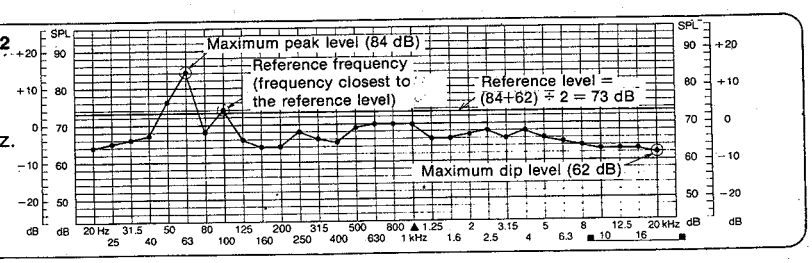
If you don't have a graphic equalizer...
Try improving the sound-field response by using heavy curtains on windows, carpeting on the floor, and different positions for the speaker systems.

11 Adjust so that the reading of the level meter is 0 dB.

Note:
Leave the volume control in this position, because this setting will be the reference level for subsequent steps.

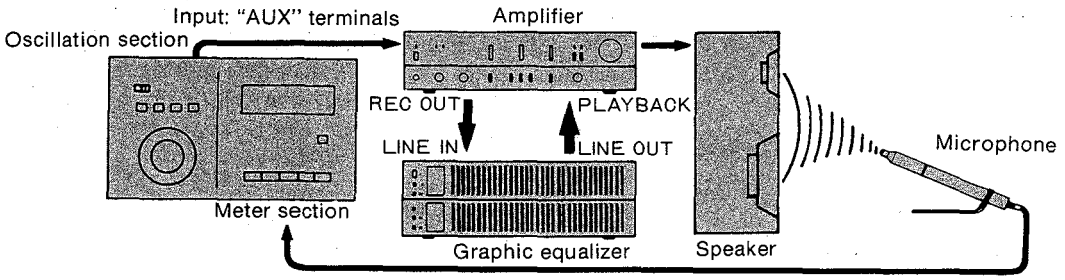
e figure below.)

Example 2
If no frequency is at the reference level, select the frequency which is closest. In the figure at the right, it is 100 Hz.


Maximum peak level (84 dB)
Reference frequency (frequency closest to the reference level)
Reference level = (84+62) ÷ 2 = 73 dB
Maximum dip level (62 dB)
SPL
dB
20 Hz 25 31.5 40 50 63 80 100 125 160 200 250 315 400 500 630 800 1 kHz 1.25 1.6 2 2.5 3.15 4 5 6.3 8 10 12.5 16 20 kHz

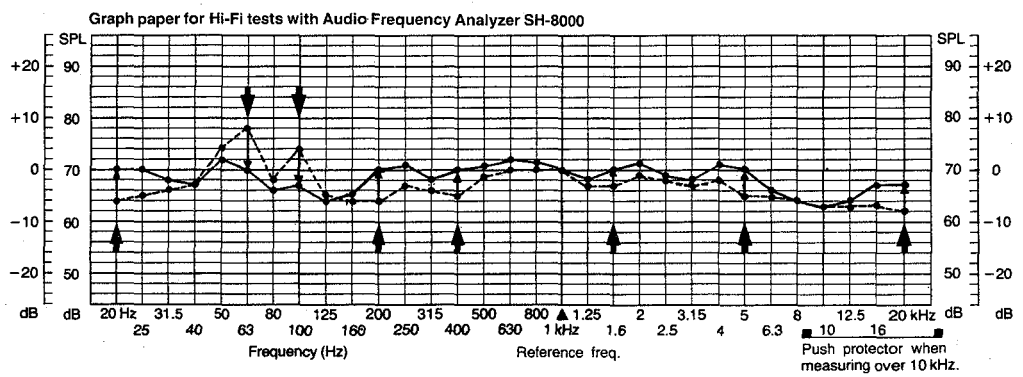
ENGLISH

Signal flow

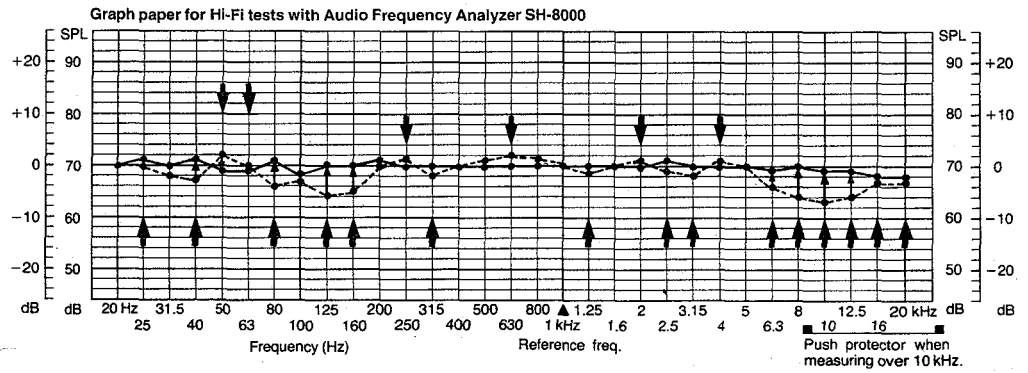


Using an equalizer with many (33) control elements for compensation (figure: left channel only)

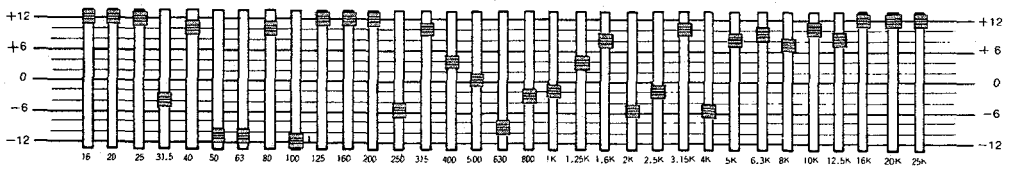
① Begin by first making compensating adjustments for the large peaks and dips.
(•———• indicates measurement data; ↕ indicate locations of compensation adjustments.)



② Then make compensation adjustments for the other peaks and dips, beginning from the low-frequency ones and repeat the adjustments until the sound-level meter reading for all frequencies is 0 dB.
(•———• indicates results of first adjustments; ↕ indicates locations of compensation adjustments.)



■ Graphic equalizer control element settings after compensation



ENGLISH

Using an equalizer with few (12) control elements for compensation (figure: left channel only)

If your graphic equalizer has 12 or less control elements for compensation adjustments, there is a limit to the frequencies for which compensation adjustments can be made.
As a result, a complete compensation cannot be made, and the procedure described below should be followed, using the measurement data for reference.

① **Make the compensation adjustment with the control elements for both ends of the frequency spectrum covered by the equalizer (16 Hz and 32 kHz).**

For 16 Hz:
While watching the 20 Hz level, adjust by using the 16 Hz control element of the equalizer so that the indication of the level meter moves close to 0 dB.
For 32 kHz:
While watching the 20 kHz level, adjust by using the 32 kHz control element of the equalizer so that the indication of the level meter moves close to 0 dB.

② **Then make subsequent compensation adjustments beginning from the equalizer control elements for the low frequencies.**

The adjustments should be made so that the total of (the level for the frequency for which there is a control element) plus (the levels of the frequency at either side) becomes near 0 dB.

Guide to equalizer compensation adjustments

To make, for example, the compensation adjustment for 125 Hz:

1) Obtain the total level for 125 Hz and the adjacent frequency at each side of 125 Hz. (Refer to the measurement data in ③.)

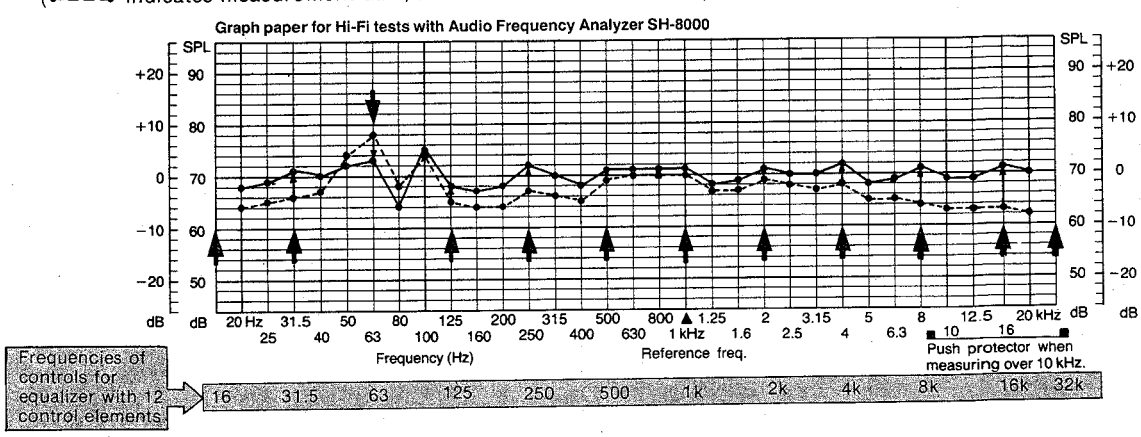
100 Hz:	+4 dB
125 Hz:	−5 dB
160 Hz:	−6 dB
Total	−7 dB

2) Then divide this total by 3:
−7 dB ÷ 3 ≒ −2 dB

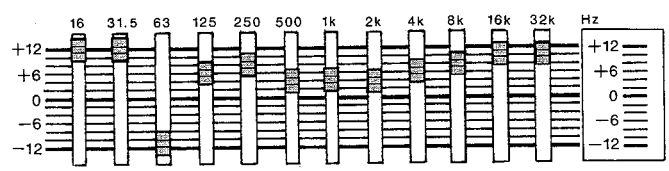
3) Use −2 dB for the compensation adjustment by the graphic equalizer.

③ **Repeat step ② for each frequency, adjusting so that the adjusted result is near 0 dB.**

(•----• indicates measurement data; ↑↓ indicates locations of compensation adjustments.)


Graph paper for Hi-Fi tests with Audio Frequency Analyzer SH-8000
SPL
+20
+10
0
−10
−20
dB
90
80
70
60
50
20 Hz 25 31.5 40 50 63 80 100 125 160 200 250 315 400 500 630 800 1 kHz 1.25 1.6 2 2.5 3.15 4 5 6.3 8 10 12.5 16 20 kHz
Frequency (Hz)
Reference freq.
Push protector when measuring over 10 kHz.
Frequencies of controls for equalizer with 12 control elements
16 31.5 63 125 250 500 1k 2k 4k 8k 16k 32k

■ Graphic equalizer control element settings after compensation



Note that a complete compensation adjustment may not be possible by using a graphic equalizer with 12 or less control elements if the peaks and dips are sharp and deep.

SEPARATELY AVAILABLE ACCESSORIES

ENGLISH

For compensation adjustment and free selection of sound to match any individual preference.

- **Stereo graphic equalizer with 33 control elements: SH-8065**

- **Stereo graphic equalizer with 12 control elements: SH-8045**

Frequency response compensation adjustments by using a graphic equalizer

When a graphic equalizer with many (33 or more) control elements, such as the Technics model SH-8065, is used, a rough compensation adjustment can be easily made by making an inversion of the frequency response for which you want to make the compensation adjustment (for example, by setting the equalizer's control to −5 dB for a +5 dB response unless the equalizer has a "response" switch, in which case you can invert the results), but a perfectly flat response cannot be obtained by using this method.

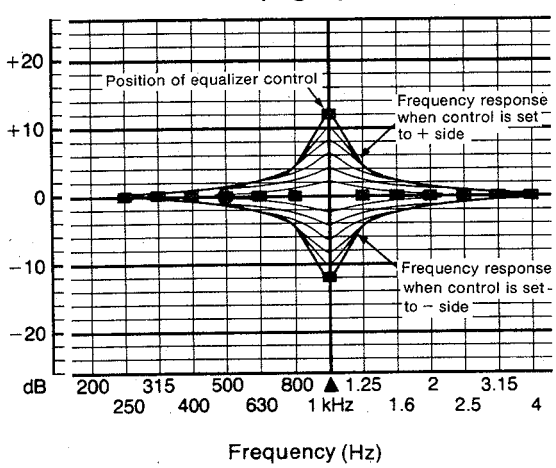
In order, therefore, to make a more precise compensation adjustment, carefully study the Operating Instructions of this unit (SH-8000) and make adjustments by using the controls of the graphic equalizer.

Please note that the positions of the graphic equalizer controls used for the simple method described above (inverted frequency response) may differ from the positions of the controls of the graphic equalizer used with this unit. This is especially true if this unit is used for a frequency response which has sharp peaks and dips.

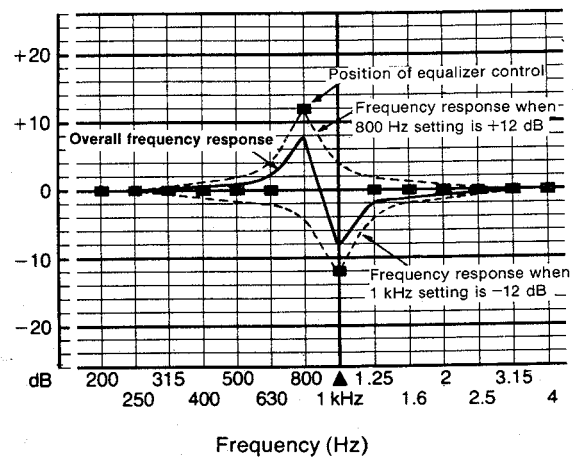
This is because, if the control for a certain frequency is moved, the frequency level for frequencies at both sides of that frequency will also change, as shown in figure 1, which is one of the characteristics of a graphic equalizer.

Thus, if, as shown in Figure 2, the control elements for the adjacent frequencies are moved in the opposite direction, the respective frequency responses will be as shown by the broken lines, but the mutual frequency responses will have effect, so that the actual amount of change in order to obtain results equivalent to the solid line will actually be lower than the value (■) of the control.

(Fig. 1)


+20
+10
0
−10
−20
dB
Position of equalizer control
Frequency response when control is set to + side
Frequency response when control is set to − side
200 250 315 400 500 630 800 1 kHz ▲ 1.25 1.6 2 2.5 3.15 4
Frequency (Hz)

(Fig. 2)


+20
+10
0
−10
−20
dB
Position of equalizer control
Frequency response when 800 Hz setting is +12 dB
Overall frequency response
Frequency response when 1 kHz setting is −12 dB
200 250 315 400 500 630 800 1 kHz ▲ 1.25 1.6 2 2.5 3.15 4
Frequency (Hz)

MEMO

ENGLISH

CAUTION

This unit has been pre-adjusted to operate precisely with the microphone included. If, therefore, it ever becomes necessary to replace the microphone, a re-adjustment is required and the unit should also be included with the microphone when it is submitted for replacement to an authorized service center or Technics dealer.

ESPAÑOL

PRECAUCION

Este aparato ha sido preajustado para funcionar de modo preciso con el micrófono incluido. Si fuera necesario cambiar el micrófono, será necesario un reajuste, y por lo tanto habrá que incluir el aparato con el micrófono al llevar éste para cambiarlo a un distribuidor Technics o centro de servicio autorizado.

FRANÇAIS

ATTENTION

Cette unité a été pré-réglée pour un fonctionnement avec le microphone inclus seulement. S'il est nécessaire de remplacer à un moment quelconque le microphone, un nouveau réglage de l'unité est impératif. Emporter l'unité avec son nouveau microphone auprès d'un service compétent ou d'un concessionnaire Technics pour la réalisation de ce réglage.

Matsushita Electric Trading Co., Ltd.
P.O. Box 288, Central Osaka Japan

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